NOAA Technical Report EDS 14

IFYGL Rawinsonde System: Description of Archived Data

Washington, D.C.
May 1976

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Environmental Data Service

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IFYGL Rawinsonde System: Description of Archived Data

Center for Experiment Design
and Data Analysis

Sandra M. Hoexter

Washington, D.C.
May 1976

U.S. DEPARTMENT OF COMMERCE
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IFYGL RAWINSONDE SYSTEM: DESCRIPTION OF ARCHIVED DATA

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ABSTRACT

This report describes the rawinsonde data collected during the International Field Year for the Great Lakes (IFYGL), a joint United States-Canadian program conducted in 1972-73 for the study of Lake Ontario and its basin. Procedures used in data processing are described, and an inventory of the archived data is given.

1. INTRODUCTION

Intensive field operations were conducted from April 1, 1972, through March 31, 1973, in support of the International Field Year for the Great Lakes (IFYGL), a joint United States-Canadian research program aimed at a better understanding of the physical, chemical, and biological processes in and above Lake Ontario and its basin. Some systems operated continuously throughout the Field Year, while others were used during intermittent, intensive observation periods. For the IFYGL rawinsonde observations, the fall was selected as the season with greatest evaporation from the lake, a process to be measured as an atmospheric water balance residual.

Shortly before the field data collection phase, the responsibility of processing the rawinsonde data was given to the Center for Experiment Design and Data Analysis (CEDDA), Environmental Data Service, National Oceanic and Atmospheric Administration. Background information on the rawinsonde system and its operation is given in IFYGL Technical Manual No. 6 (Callahan et al., 1976).

This report contains a description of the methods used in the data processing and an inventory of the final data set, which is available from the IFYGL Archive. Requests for data should be addressed to:

IFYGL Data Manager
National Climatic Center, EDS, NOAA
Federal Building
Asheville, N.C. 28801

Telephone: 704-258-2850, ext. 754; FTS 672-0754

2. DATA ACQUISITION SYSTEM

A network of six rawinsonde stations, three in the United States and three in Canada, was established around Lake Ontario for IFYGL. Station locations and elevations above mean sea level are shown in figure 1. Releases were scheduled from September 21 to December 10, 1972. As shown in table 1, flights were launched every 3 hr from September 22 to 26, October 2 to 18, October 30 to November 14, and November 21 to December 9. During the remaining time periods, soundings were made only twice a day.

The LORAN-C LO-CATE II Navaid Integrated Upper Air System Model WL-2D(M), developed and manufactured by Beukers Laboratories, Inc., and the compatible radiosonde AUTOMET Model 1223-100, built by the VIZ Manufacturing Co., were used during IFYGL. This is a complete all-weather upper air wind-finding and meteorological sounding system that collects, transmits, processes, displays, and records data on magnetic tape and strip charts. No radars, stable platforms, or dish antennas are required. LO-CATE is based on the retransmission concept developed by Beukers Laboratories to determine the position and velocity of remote objects. A balloon-borne radiosonde reports its position to a base station by receiving and retransmitting navigation aid (Navaid) signals via a 403-MHz UHF telemetry link (fig. 2). Transmitting stations were located at Cape Fear, North Carolina (master); Dana, Indiana (slave "A"); and Nantucket, Massachusetts (slave "B").

Table 1.--IFYGL rawinsonde flight schedule

Date (1972)		Time (GMT)							
		0000	0300	0600	0900	1200	1500	1800	2100
September	16-18	x				x			
	19	x							
	20								
	21					x			
	22-26	x	x	x	x	x	x	x	x
	27-30	x				x			
October	1	x				x			
	2-18	x	x	x	x	x	x	x	x
	19-29	x				x			
	30-31	x	x	x	x	x	x	x	x
November	1-14	x	x	x	x	x	x	x	x
	15-20	x				x			
	21-30	x	x	x	x	x	x	x	x
December	1-10*	x	x	x	x	x	x	x	x

*Program terminated before December 10 at some stations because sondes were not available.

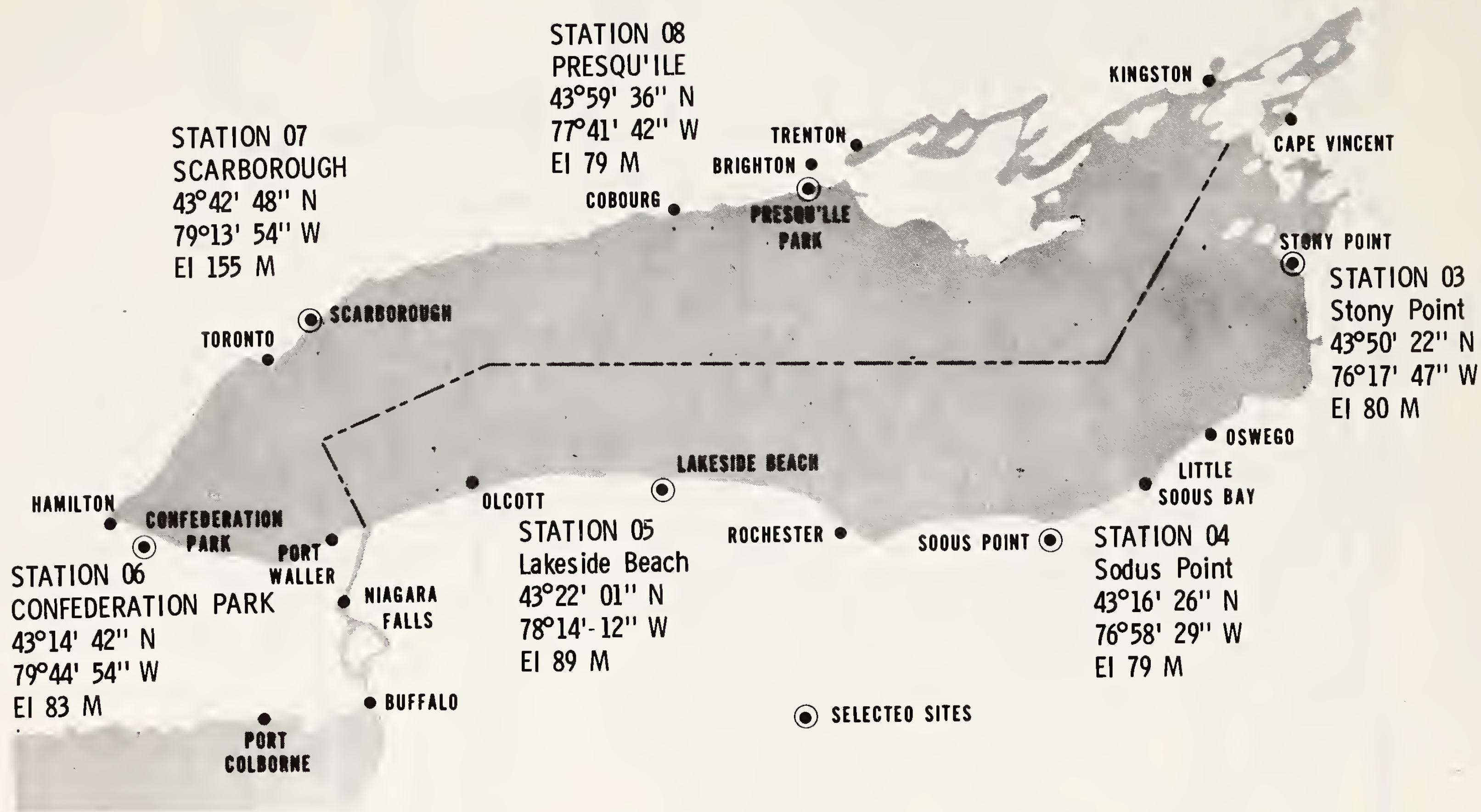


Figure 1.--IFYGL rawinsonde station locations, showing elevations in meters above mean sea level.

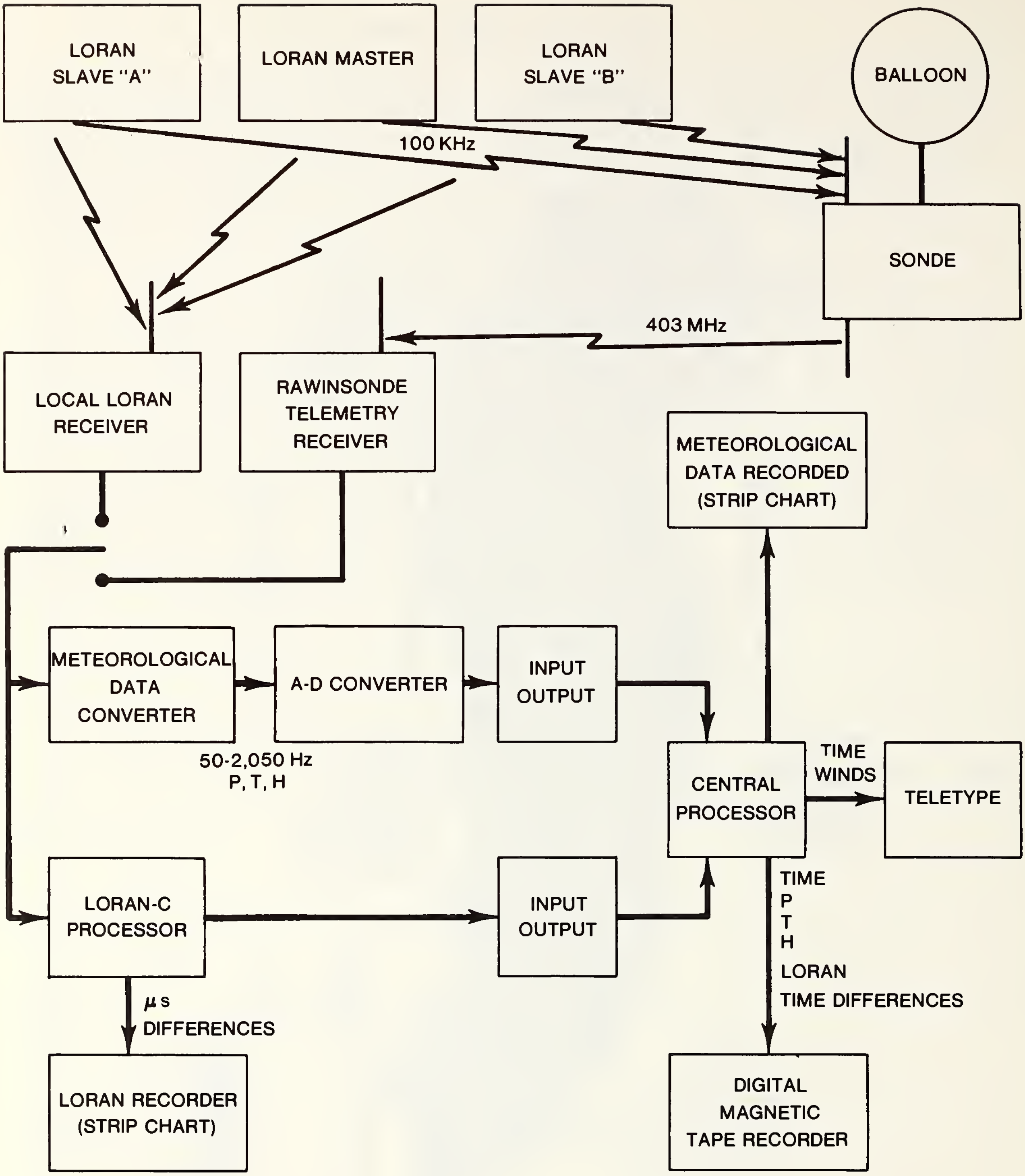


Figure 2.--LO-CATE system.

Premium, factory-calibrated thermistors and hygristors, as well as specially calibrated baroswitch units, were used. Specifications are listed in table 2.

The expected performance (rms errors) of the integrated systems was as follows:

Winds	rms vector error ± 0.5 mps for 1-min averages
Temperature	± 0.2°C rms (sensor accuracy ± 0.1°C with correction)
Humidity	± 5 percent relative humidity rms (sensor accuracy ± 2 percent with correction)
Pressure	± 1 mb (same as sensor accuracy)

Table 2.--Radiosonde specifications

Element	Remarks
Radio frequency	403 MHz ± 3 MHz
Modulation (FM)	Meteorological data deviation, 200 kHz
	Meteorological data pulse width, 250 μs (a.c. coupled)
	Navaid sensitivity 500 μV/m yields 450 kHz peak-to-peak deviation
Size	6 x 6 1/2 x 13 1/8 in.
Weight	Sonde, 530 g Battery (wet), 170 g Total unit, 700 g
Power input	18.0 V, 110 mA 6.6 V, 20 mA 5.0 V, 80 mA
Power output	300 mW (nominal)
Battery	Magnesium cuprous chloride (water activated), VIZ 1223-18; maximum size 2 x 2 1/2 x 1 5/8 in.
Pressure sensor	Aneroid capsule (NI-SPAN C)
Pressure accuracy	Less than 1 mb (average rms)
Temperature sensor	Rod-type thermistor, 14,000 ohms at +30°C (nominal)
Humidity sensor	Carbon type, fast response
Humidity accuracy	± 2 percent relative humidity

2.1 Meteorological Data

Meteorological data were conveyed by frequency modulation of the 403-MHz transmitted carrier frequency of the radiosonde. The modulation frequency varied from 50 to 2,100 Hz as a function of the parameters being sensed. The transmitter power was about 300 mW. Specially selected carbon hygristors and ceramic rod thermistors measured humidity and temperature respectively. Pressure was obtained from an aneroid cell that drove a pen-arm contact over a strip on which 180 contacts were printed, each representing a discrete pressure. Each contact placed one of three resistors in the modulator circuit in a fixed pattern so that each contact could be identified in the data output. The pattern was such that recovery was possible in the event the data stream was temporarily interrupted. Intermediate pressures between the beginning edge of adjacent contacts could be determined by interpolation in the data reduction process.

A meteorological data cycle was completed every 0.8 s. Approximately 0.2 s each was spent on temperature, humidity, pressure, and a reference near 2,000 Hz produced by a fixed resistor. Between contacts, a midscale reference frequency, near 1,000 Hz, was produced by a precision resistor.

Switching among the four signals was done by a solid-state commutator. The known sequence of parameters, and the time-based switching of these parameters, made the meteorological data output suited to fully automatic data processing. This is in contrast to the conventional United States radiosonde, in which the pressure contacts are used for switching the other parameters.

On the ground, the 403-MHz receiver extracted the meteorological data (50 to 2,100 Hz) and sent them to a meteorological data converter. A meteorological data synchronizer phase-locked an internal segment generator to the high-reference signal telemetered from the sonde. This synchronization allowed timing, decoding, and digitizing of the meteorological elements by the use of a 10-MHz clock. Each time a new parameter was sensed on the ground, the data were digitized and an output was signalled to the central processor, which then converted the data into a format compatible with the magnetic tape recorder. The central processor also drove a strip-chart recorder, which recorded the data in analog form.

2.2 Wind Data

At the sonde, the LORAN-C signals were captured by an antenna and miniature receiver that modulated the 403-MHz carrier at the 100-kHz LORAN-C frequency. The ground 403-MHz receiver extracted the LORAN-C data, and forwarded them to the LO-CATE processor. The processor produced two output signals, each representing the time difference between the signals from two LORAN-C transmitters. The two sets of time differences, expressed in terms of tenths of microseconds, were recorded on an analog strip-chart recorder and were also sent in digital form to the central processor, which put them into a format suitable for recording on the magnetic tape recorder.

The time differences between the signals received from a pair of the LORAN-C transmitters placed the sonde on a hyperbolic line-of-position (LOP). The intersection of two LOP's, one from each of the two pairs of signals, established sonde position, with change in position from second to second being a measure of the wind at the level of the sonde.

The accuracy of LORAN-C wind data depends on both the spacing and the crossing angles of the LOP's established by the pairs of transmitting stations. The combination of LORAN-C stations in North Carolina, Massachusetts, and Indiana resulted in close to optimum geometry in the Lake Ontario area. Since winds were derived from changes in position, rather than absolute positions, propagation anomalies tended to cancel out.

2.3 Recording Methods

Four methods were used in recording data in the IFYGL rawinsonde network. The primary mode was a digital magnetic tape recorder, seven-track IBM compatible, on which data were recorded in raw digital form for later processing. The recorded data consisted of time, frequency count of each meteorological parameter and reference each 0.8 s, and time differences for each of two pairs of LORAN-C signals each second.

Two analog strip-chart recorders were used as backup. One was dual-pen and displayed two traces, one representing the time-of-arrival difference between one pair of LORAN-C stations, and the other the same information for the other pair. Its main purpose was to provide a real-time monitor of the quality of the data. The second strip-chart recorder provided a record of the meteorological data--much like that obtained by the conventional radiosonde recorder. Because of the fast commutation rate, however, only samples of the meteorological data were recorded, since the pen drive could not react fast enough to catch each 0.2-s transmission period. This recorder, also, served mainly as quality monitor.

The fourth recording device was an input-output teletype. Before each flight, surface readings, actual time, flight number, serial number, and sensor lot numbers were entered through the keyboard and written out onto the magnetic tape as a flight header. A second flight header consisted of baroswitch calibration information (pressure for each contact) entered onto the magnetic tape from punched paper tape provided by the VIZ Manufacturing Co. During each minute of the flight, the teletype printed out 1-min averaged winds and range and bearing from the ground station to the radiosonde.

3. DATA PROCESSING

The procedures used at the Center for Experiment Design and Data Analysis in processing the IFYGL rawinsonde data are illustrated in figure 3. The original 267 tapes were first dumped, copied, and checked for readability and completeness. The copied tapes were then run through the TRANS program for unpacking and translating the data to CDC-6600 binary words and for time assignment and correlation of the meteorological and LORAN-C data. The output consisted of 66 tapes, each containing 48 soundings. These tapes were

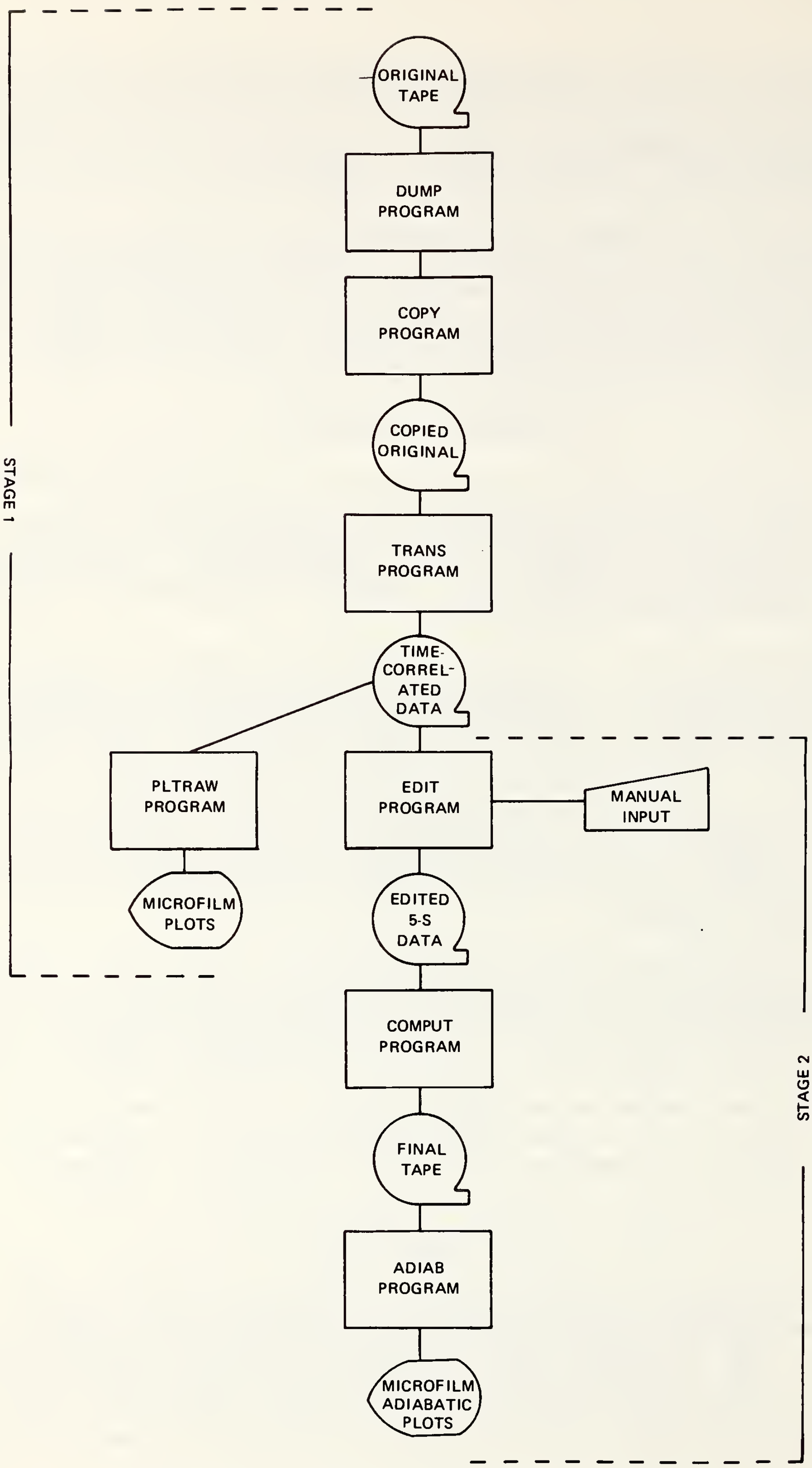


Figure 3.--IFYGL data processing system.

run through the PLTRAW program, which produced time-series plots on 35-mm microfilm of the unedited data. This completed the first stage of processing.

In the second stage, the time-series plots were analyzed, and a study was made of the manual corrections needed for missing or abnormally noisy data. The EDIT program was written to carry out both automated and manual corrections. The output consisted of 5-s averages of edited data, which were then passed through the COMPUT program, which converted the meteorological data to temperature, specific humidity, and pressure values, and the LORAN-C time differences to values of wind speed and direction. Pseudoadiabatic plots on 35-mm microfilm were also prepared from these data. All programs were written in FORTRAN for NOAA's CDC-6600 computer in Suitland, Maryland.

3.1 First-Stage Processing

The COPY program was written primarily to generate backup for the original tapes. It was also used to position end-of-file marks properly, and to remove abnormally large gaps in the data as well as completely unreadable records. The tapes were copied as soon as received to provide feedback on the information contained to the field stations. The emphasis at this point was readability and completeness of the data. The TRANS program was then used for unpacking the data for parameter and cycle identification, and for time correlation of the meteorological and LORAN-C data.

The data on the field tapes were a mixture of modified ASCII format and binary data. After these had been converted to CDC-6600 binary words, the parameters had to be identified. The LORAN-C data, recorded every second, were easily distinguishable from the meteorological data because of their large values. The meteorological data were recorded every 0.8 s in the frequency range of 50 to 2,100 Hz. The beginning of a meteorological cycle was identified by a reference frequency value of 2,000 ± 100 Hz. The three meteorological values following a reference frequency were stored as pressure, temperature, and humidity, except in three cases:

(1) If one of the next three values could be identified as a new reference, the remaining cycle was indicated as missing, and a new cycle was begun.

(2) If less than four meteorological data values were found between two LORAN-C signals, the remaining cycle was indicated as missing (since the meteorological commutator sends no less than four nor more than six meteorological values per second), and a search for a new reference was begun.

(3) If six values were found and no reference was identified, a cycle with missing data was stored, and a search for a new reference was begun.

The time assigned to each meteorological data cycle was derived from computer clock time, which was recorded at the beginning of each data record. The time interval of approximately 16 s between one record and the next was divided into equal increments, corresponding to the number of data cycles in the record. Based on these increments, the times were computed for the successive data cycles in the record.

The LORAN-C time-delay values were interspersed at 1-s intervals among the meteorological data, with time-delay values from slave A (TDA) and slave B (TDB) appearing at alternating seconds. Since no data were missing and the two sets of values were easily distinguishable, they were stored in two arrays, one representing data at even number and the other at odd number of seconds after rawinsonde release. Times assigned to these data were integral seconds, beginning with the first integral second on or after the time of the record. At the end of each record a check was made to ensure that:

(1) The number of TDA values did not differ by more than one from the number of TDB values.

(2) The total number of LORAN-C values received in a record did not differ by more than one from the number of seconds making up the record.

(3) The total number of LORAN-C values after rawinsonde release did not differ by more than one from the total number of seconds after release.

No discrepancies of more than 2 s were found, and no corrections were made.

The PLTRAW program was used for displaying the output from the TRANS program in time-series plots on 35-mm microfilm, still in the form of frequencies for the meteorological data (fig. 4) and in time differences for the LORAN-C data. The flight header and baroswitch calibration information was listed before each sounding,and any that failed range or internal consistency tests were flagged. This film was used for determining manual correction and insertions needed, and is the best display of the quality of the original data.

3.2 Second-Stage Processing

The EDIT program was used for pressure contact recognition and automated editing of the data. Manual input to the program was provided as necessary.

3.2.1 Automated Editing

The first step in the editing program was to convert the contact pressure pattern to actual contact numbers. The pattern recognition routine was based on value changes every 5th and 15th contact. The surface pressure was used for determining the first contact after rawinsonde release. If the first 10 contacts did not fit this pattern, it was assumed that the surface reading was inaccurate, and a contact number one higher was used as the initial contact. If, again, the pattern could not be established, one contact lower than the surface contact was used as the starting point. If this failed, the flight was examined, and a contact correction was entered manually or the sounding was deleted. If, after the initial contact pattern had been established, the recognition routine failed, the program would insert one contact on the assumption that it had been missed because of noisy data. If the routine still continued to fail to recognize the pattern, the sounding was terminated and the time-series plots of the data were examined to assess if additional data could be salvaged from the sounding.

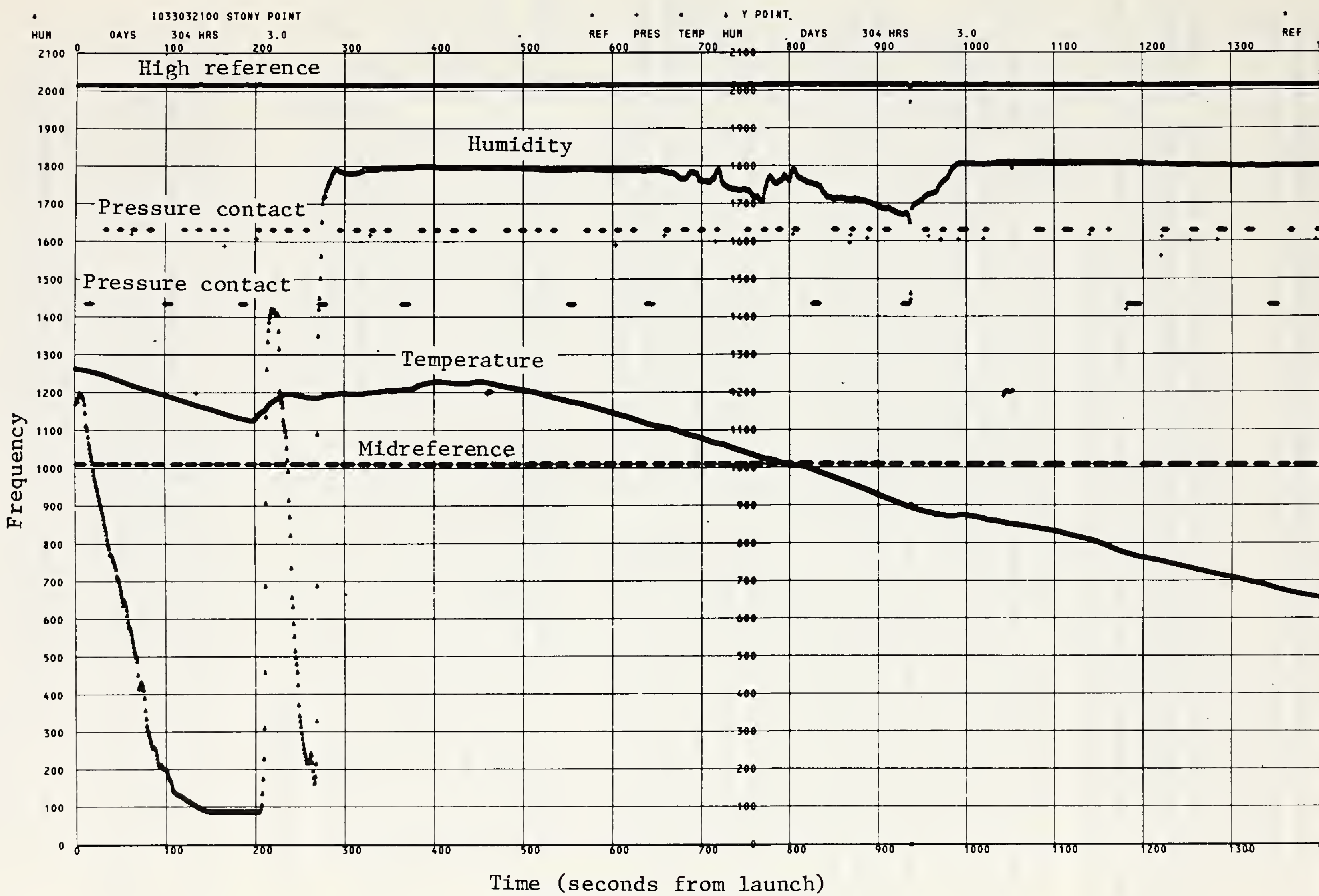


Figure 4.--Sample time-series plot of original meteorological data (0.8-s resolution).

Once the highest contact had been established, a three-pass editing scheme was used in processing the high-reference (2,000 Hz), midreference (1,000 Hz, recorded when the baroswitch was "off contact"), temperature, humidity, and LORAN-C values.

In the first pass, a gross range test was applied to the values, and missing-data indicators were inserted for points that were obviously erroneous. If data gaps extended beyond the least-squares fit used in the second pass (see below), they were filled through linear interpolation. These interpolated values are indicated by flags in the final archive product.

In the second pass, a second-degree least-squares fit was applied to the data by means of a routine developed by Acheson (1975). For high reference and midreference, 64 points were fitted at a time. Point values less than 2.5 times the standard deviation from the curve were accepted. Discarded values (including those discarded in the first pass) were replaced by values from the curve. Humidity and temperature were edited by fitting 32 points at a time and using 3 and 2.5 times the standard deviation respectively. On all parameters, a 50-percent overlap was used for successive least-squares fits, i.e., if 64 points were to be fitted, points 1 to 64 were used, followed by 32 to 96, 64 to 128, and so on.

For LORAN-C time differences, 100 points were used at a time in the least-squares fit, with 3.0 times the standard deviation used as the acceptance criterion. Lane jumps--a multiple of 10 μs change in the data--occurred, and a special routine was written to remove them between the first and second pass of the EDIT program. All missing data were replaced by extrapolation, instead of interpolation, in case a lane jump occurred where data were missing.

The third pass consisted of routines that reduced the data to 5-s averages. The averages of the metorological data were formed from the 0.8-s values within a 5-s interval. Of the two LORAN-C time differences, one set (TDA) came in on odd seconds after rawinsonde release, i.e., 1, 3, 5, 7, etc., while the other (TDB) came in on even seconds, i.e., 2, 4, 6, 8, etc. The 5-s averages were therefore formed by alternating averaging of two and three values. The first pair was formed by the values at seconds 1 and 2; the pair at second 5 was formed by the average of TDA values at seconds 3, 5, and 7, and the average of TDB values at seconds 4 and 6; and the pair at 10 s was formed from averaged TDB values at seconds 8, 10, and 12, and TDA values at seconds 9 and 11.

3.2.2 Manual Corrections

Manual corrections were made in a manner that allowed maximum flexibility in deleting and inserting data in order that the data could be processed as much as possible by the automated procedure described in the preceding section. Based on review of the time-series microfilm plots of the original data, the following actions were often necessary:

(1) Some flights were deleted. This was done when a sounding was aborted and when the baseline information had been recorded although no sounding had been made.

(2) If the signal had degenerated before the end of a sounding, the time and contact of balloon burst or of the last good data point were identified to aid the contact pattern routine in not reading beyond the end of good data.

(3) In the case of very noisy data or of interference from another sonde, any parameter of a given flight was deleted for a period of up to 100 s. Such deletions were treated in the automated editing as missing data.

(4) Values were strategically inserted into the pressure contact pattern when the data were too noisy to be recognized by the pattern recognition routine.

(5) Inaccuracies in the flight header information, which had been flagged on the microfilm plots, were corrected by review of log books and of information pertaining to other flights.

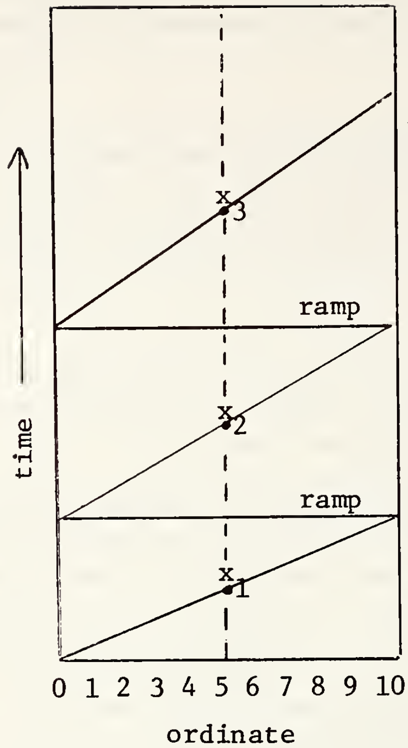
(6) An entire flight header, an entire baroswitch record, or all meteorological or LORAN-C data, or any combination of these, were inserted when a substantial part or all the data for sounding were either missing or could not be read off the tape. The data for the flight header were obtained from forms filled out in the field. The baroswitch calibration information was obtained from a listing supplied by the manufacturer for each sonde. The meteorological and LORAN-C data were extracted from strip charts. The meteorological data had been recorded in the field in ordinate values of 0.0 to 10.0. Based on these strip charts, temperature, humidity, and midreference were coded every contact. These data were punched on cards, merged with the automatically recorded data, and converted to frequencies by means of

$$F_i = \frac{D_i \times 1000}{4.75 + M_i - M_I} ,$$

where

F_i = frequency value in hertz,
i = contact number,
D = ordinate value,
M_i = midreference ordinate, and
M_I = initial midreference ordinate from the sonde checkout or baseline plot.

The LORAN-C values were recorded in ordinates increasing to the right of the strip chart, and with ordinate 10 equal to 10 μs. "Ramp" changes were also recorded. A "ramp" is defined as a shift in the recording pen from ordinate 10 to ordinate 0, so that subsequent values are increased by 10 for each right-to-left ramp after time 0, and can be illustrated as follows:



where $x_1 = 5$, $x_2 = 15$, and $x_3 = 25$.

The LORAN-C time-delay value was derived from

$$T_i = B + D_i + \sum_{i=1}^{N} R_i \times 10 \quad ,$$

where

- i = ith 30-s point,
- T_i = time-delay value in ordinates,
- B = base ordinate value of the time-delay signal at rawinsonde launch,
- D_i = ordinate value recorded,
- R_i = ramp change, and
- N = last 30-s point to be coded.

To ensure compatibility between the manually worked up data and those recorded automatically, as well as between meteorological and LORAN-C data, all data were interpolated to 5-s intervals. Seven percent of the soundings had to be worked up manually. These were converted to scientific units in the same manner as the automatically recorded data.

3.2.3 Computations

With minor modification, the computation program for the meteorological data was the same as the one used in processing the rawinsonde data collected during the Barbados Oceanographic and Meteorological Experiment (CEDDA, 1975).

3.2.3.1 Reference Correction. Temperature, relative humidity, and midreference frequency (the pressure contact frequency transmitted between contacts, 1,000 Hz) were corrected for high-reference frequency by use of

$$CF = \frac{RF \times 2000}{RR} \quad , \qquad (1)$$

where

CF = corrected frequency,
RF = received frequency, and
RR = received high-reference frequency.

NOTE: The meteorological data were received as periods and were converted to frequencies by dividing by 5×10^7.

3.2.3.2 Sensor Resistance. Internal, thermistor, and hygristor resistances of the sonde were computed as follows:

Internal resistance

$$B = \frac{MR \times RZERO}{2000. - MR} - MR \times 0.095 \quad , \qquad (2)$$

where

B = internal resistance in ohms,
MR = midreference frequency corrected by use of eq. (1), and
RZERO = the value of the midreference resistor (47,775 ohms; maximum error = 0.1 percent).

Thermistor resistance

$$TR = \frac{2000. \times (B + TF \times 0.095)}{TF} - (B + TF \times 0.095) \quad , \qquad (3)$$

where

TR = thermistor resistance in ohms,
B = internal resistance from eq. (2), and
TF = corrected temperature frequency from eq. (1).

Hygristor resistance

$$R = \frac{2000. \times (B + HF \times 0.095)}{HF} - (B + HF \times 0.095) \quad , \qquad (4)$$

$$HR = \frac{1.2 \times 10^6 \times R}{1.2 \times 10^6 - R} \quad , \tag{5}$$

where

HR = hygristor resistance,
B = sonde internal resistance from eq. (2), and
HF = corrected humidity frequency from eq. (1).

Equation (5) was necessary because of the 1.2-megohm resistor placed in parallel with the hygristor. Note that R was sometimes equal to or greater than 1.2×10^6 ohms; HR was then set at 1.2×10^6, which can be used as a limiting value for HR in all cases.

3.2.3.3 Temperature. Indicated temperature in degrees Celsius is given by

$$t = \frac{16949.57}{[9.1217420 + \log_{10} (\frac{TR}{R30})]^2 - 27.37098} - 273.00 \quad , \tag{6}$$

where

TR = thermistor resistance from eq. (3), and
R30 = resistance of the thermistor at 30°C (furnished by the factory for each thermistor and one of the manual inputs provided in the field for processing each sounding: usually about 14,000 ohms.)

A calibration correction was added to the indicated temperature to obtain the corrected temperature, ct,

$$ct = t - 0.278246 - 0.00314038t + 0.000277829t^2 + 0.00000367975^3, \tag{6a}$$

where the constants were determined from data furnished by the manufacturer. All thermistors used during IFYGL were required to conform to this calibration curve within 0.1°C.

Absolute temperature was obtained from

$$T = ct + 273.15 \quad .$$

3.2.3.4 Relative Humidity. Relative humidity was computed in three steps. First,

$$RH25 = 110. - \text{antilog} \frac{[4.733 - \log_{10} (\frac{HR}{R33})]}{2.3} \quad , \tag{7}$$

where

RH25 = relative humidity for a temperature of 25°C,
HR = hygristor resistance from eq. (5), and

R33 = hygristor resistance at 33 percent relative humidity (furnished by the manufacturer for each lot of hygristors; about 10,000 ohms).

The hygristor lot number was stamped on the lid of each hygristor and was one of the manual inputs for each sounding.

Second, a calibration correction was applied to RH25 by means of

$$RHTA = A + B \times RH25 + C \times RH25^2 + D \times RH25^3 \quad , \qquad (8)$$

where A, B, C, and D are calibration constants determined for the particular lot of hygristors from information furnished by the manufacturer, including corrections for inaccuracies in eq. (7). The calibration constants are listed in table 3.

Table 3.--Calibration constants

Hygristor lot	R33	A	B	C	D
151	10,250 ohms	-46.1998	2.58845	-0.0422196	0.000214017
152	10,600 "	-44.7099	2.56450	-0.0431264	0.000227240
153	10,512 "	-46.3526	2.62893	-0.0437164	0.000224769
154	10,290 "	-47.8125	2.69001	-0.0446630	0.000233299
155	10,660 "	-45.6916	2.59527	-0.0431746	0.000225196

Third, RHTA was corrected for departure from 33 percent relative humidity and a temperature of 25°C by use of

$$RHT = RHTA + \frac{c(RHTA - 33.) + (t - 25.)}{RHTA} \quad , \qquad (9)$$

where

RHT = relative humidity at ambient temperature,
c = 0.25 if RHTA > 33,
c = 0.03 if RHTA < 33, and
t = temperature from eq. (6).

At low temperatures and humidities, the correction term in eq. (8) extends beyond the data from which it was derived and becomes unrealistic. Therefore, a variable cutoff was used, which gave minimum output humidity = 8.0 - 0.1 t, or 10 percent, whichever was greater.

3.2.3.5 Thermistor Lag Correction. The thermistor lag coefficient was computed from the following formula, derived by L. D. Sanders and J. T. Sullivan of CEDDA from data provided by the National Weather Service:

$$\lambda = 9.77 \, (\rho v)^{-0.43} \quad , \qquad (10)$$

where

λ = lag coefficient of the thermistor in seconds,
ρ = air density in kilograms per cubic meter,

$$= \frac{0.34837\ P}{T(1. + 0.000608q)} \quad , \tag{10a}$$

T = ambient air temperature in degrees Kelvin,
q = specific humidity in grams per kilogram,
v = rate of rise of rawinsonde in meters per second, and
P = atmospheric pressure in millibars.

The basic correction equation is (Middleton and Spilhaus, 1953, p. 65)

$$\frac{d\theta}{dt} = \frac{-1}{\lambda}(\theta - \gamma_o - \beta t) \quad , \tag{11}$$

where

θ = indicated temperature at time t,
t = time from initial time,
λ = lag coefficient from eq. (10),
γ_o = true temperature at initial time, and
β = temperature lapse rate with respect to time; assumed constant over a short time interval.

The true temperature at time t is, of course,

$$\gamma = \gamma_o + \beta t \quad . \tag{12}$$

Combining eqs. (11) and (12) gives

$$\gamma = \theta + \lambda\frac{d\theta}{dt} \quad . \tag{13}$$

Equation (13) can be approximated for finite differences by

$$\gamma_n = \theta_n + \gamma\left(\frac{\theta_{n+1} - \theta_{n-1}}{t_{n+1} - t_{n-1}}\right) \quad , \tag{14}$$

where

n = sequence number of data point, and
t = time of data point from launch.

For the IFYGL data,

$$t_{n+1} - t_{n-1} = 10 \text{ seconds} \quad ,$$

Equation (14) was used in lag-correcting the thermistor data after the transfer equations and calibration corrections had been applied. The use of a 10-s Δt results in a small amount of smoothing at the lower levels (less than about 200 mb), where the lag coefficient is less than 10 s, and a slight increase in roughness at higher levels. For initializing, the lag correction computed for n = 7 was also used for the preceding points.

3.2.2.6 Hygristor Thermal-Lag Correction. The thermal lag correction for the IFYGL hygristor data was the same as the one used for the BOMEX data (CEDDA, 1975), except that the ventilation rate of the hygristor was 0.9 times the rate of rise. The lag coefficient was computed from

$$\lambda = \frac{34.9}{(\rho V)^{0.4}} \quad [\text{or } 34.9\ (\rho V)^{-0.4}] \quad , \tag{15}$$

where

λ = thermal lag coefficient of hygristor in seconds,
ρ = air density in kilograms per cubic meter; eq. (10a),
T = ambient air temperature in degrees Kelvin,
q = specific humidity in grams per kilogram, and
V = ventilation rate of hygristor in meters per second.

The basic correction equation is the same as for the thermistor, but the problem is the reverse because the true air temperature is known and the indicated temperature (hygristor temperature) must be determined. Therefore, eq. (11) must be integrated for $\theta=\theta_o$ when t=0. This gives

$$\theta = \theta_o\, e^{-t/\lambda} + \beta t + (\gamma_o - \beta\lambda)(1 - e^{-t/\lambda}) \quad , \tag{16}$$

where

θ = temperature of hygristor at time t,
θ_o = temperature of hygristor at time zero,
γ_o = air temperature at time zero (determined from thermistor output),

$$\beta = \frac{\gamma_n - \gamma_{n-1}}{t_n - t_{n-1}} \quad , \tag{17}$$

n = sequence numbers of data points,
γ_n, γ_{n-1} = air temperature at two adjacent data points, and
t_n, t_{n-1} = times at adjacent data points (the interval being normally 5 s for the IFYGL data).

Note that if $\theta_o = \gamma_o$, eq. (11) reduces to

$$\theta - \gamma = -\beta\lambda(1 - e^{-t/\lambda}) \quad ,$$

which is eq. (3.6) given by Middleton and Spilhaus (1953, p. 65).

3.2.3.7 Wind Computations. The winds were computed from pairs of LORAN-C time-delay values.

The LORAN-C signals were frequently cluttered by two types of jump in the time-delay value (Sullivan and Matejceck, 1975). The "sudden lane jump" was an increase or decrease by a multiple of 10 μs between adjacent samples. This was easily detected by software, and the spurious change was deleted. The "slow lane jump" was a spurious rapid change spread over a period of 10 to 30 s or more. Most of these were corrected by manual input, but some minor ones were missed and were corrected automatically by the following procedure.

Standard errors of estimate were computed for each 5-s data point from time t = 30 s to the end of the data. The standard error of estimate of Y on X is

$$S_{Y.X} = \sqrt{\frac{\Sigma(Y-Y_{est})^2}{N}} \quad . \qquad (18)$$

From the least-squares regression line,

$$Y_{est} = A + BX \quad , \qquad (19)$$

From eqs. (18) and (19) is obtained (Spiegel, 1961, p. 250)

$$S^2_{Y.X} = (\Sigma Y^2 - A\Sigma Y - B\Sigma XY)/N \quad , \qquad (20)$$

where

Y = LORAN-C time delay in microseconds,
X = time from start of regression period in seconds,
N = number of cases in the regression period
= 13 for the 1-min regression periods used,
S^2 was computed for 1-min periods centered on each 5-s data point in turn, and
A and B are coefficients of the least-squares regression line.

A lane jump was assumed to have occurred when $S^2_{Y.X} \geq 0.75$, an empirical value determined from samples of the data. The signal was assumed to have returned to normal when $S^2_{Y.X}$ again became less than 0.75.

Bias introduced by the lane jump was removed by assuming that the beginning of the jump was detected at time t and the end at t + Δt (fig. 5). An estimate of $Y_{t+\Delta t}$ was computed from

$$\hat{Y}_{t+\Delta t} = (Y_{t-10} + Y_{t-5} + Y_t)/3. + B_{t-35}\Delta t \quad ,$$

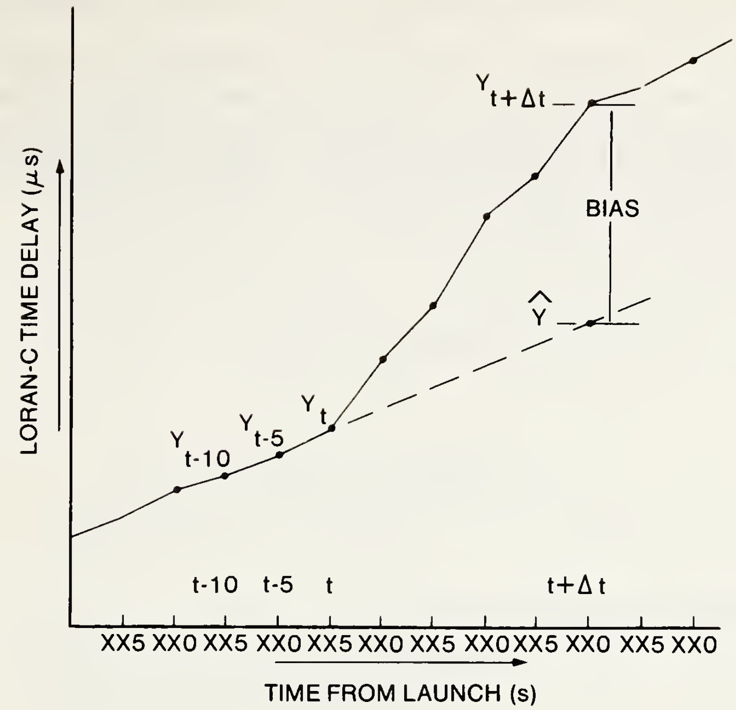


Figure 5.--Illustration of introduction of bias by lane jump.

where B_{t-35} was determined from the regression eq. (19) for the 1-min period ending at the data point before the slow jump was detected. The bias was then computed from

$$\text{Bias} = Y_{t+\Delta t} - \hat{Y} \quad ,$$

and all time delays from $t + \Delta t$ to the end of the sounding were corrected by

$$Y_{time} = Y_{time} - \text{Bias} \quad .$$

After lane jumps had been corrected, the data were smoothed by replacing each 5-s time-delay value with

$$\hat{Y}_t = A + Bt + Ct^2 \quad ,$$

where coefficients A, B, and C were determined from a 2-min sample of data centered on time t. For each point in the sample it was required that

$$\frac{(Y - \hat{Y}_t)^2}{\sigma_{\hat{Y}_t}} \quad 2.5 \quad ,$$

with up to half the sample allowed to be discarded. Final values of A, B, and C used for smoothing were computed from the data points that passed the test.

The edited time-difference values were converted to X and Y values, as well as to latitude and longitude, by an algorithm similar to that described by Acheson (1974). The winds were computed from the change in positions with respect to time. The u and v components were computed from the x and y 5-s displacements (where t is time) as follows.

For 5-s data:

$$u_t = \frac{x_{(t+5)} - x_{(t-5)}}{10.} \quad ,$$

$$v_t = \frac{y_{(t+5)} - y_{(t-5)}}{10.} \quad .$$

For 50-mb and p* (10-mb) surfaces:

$$u_t = \frac{x_{(t+30)} - x_{(t-30)}}{60.} \quad ,$$

$$v_t = \frac{y_{(t+30)} - y_{(t-30)}}{60.} \quad .$$

3.2.4 Adiabatic Plots and Microfilm Listing

The final step in the second-stage processing was the preparation of adiabatic plots on 35-mm microfilm (fig. 6) and a listing of all parameters. The plots show, at 5-s intervals, wind speed and direction, u and v components, relative humidity, air temperature, and dewpoint temperature.

4. ARCHIVE FORMAT AND DATA INVENTORY

Three sets of data were generated for the archive: 5-s data, 10-mb surfaces, and 50-mb surfaces, the last two computed from the 5-s data by interpolation between the two values on each side of the surface. All are available on magnetic tape. The data are also plotted in the form of adiabatic charts on 35-mm microfilm, with accompanying listings of all parameters.

The data set consists of 2,953 rawinsonde soundings, 259 of which had to be worked up manually. Flight release numbers are numbers assigned in the field and are not necessarily consecutive because of deletion of soundings that could not be processed. The values stored at time 0 are derived from surface instrumentation rather than the sonde. Although all parameters are archived at a resolution of 5 s, there is considerable overlap in the LORAN-C winds, and their actual resolution is about 1 min.

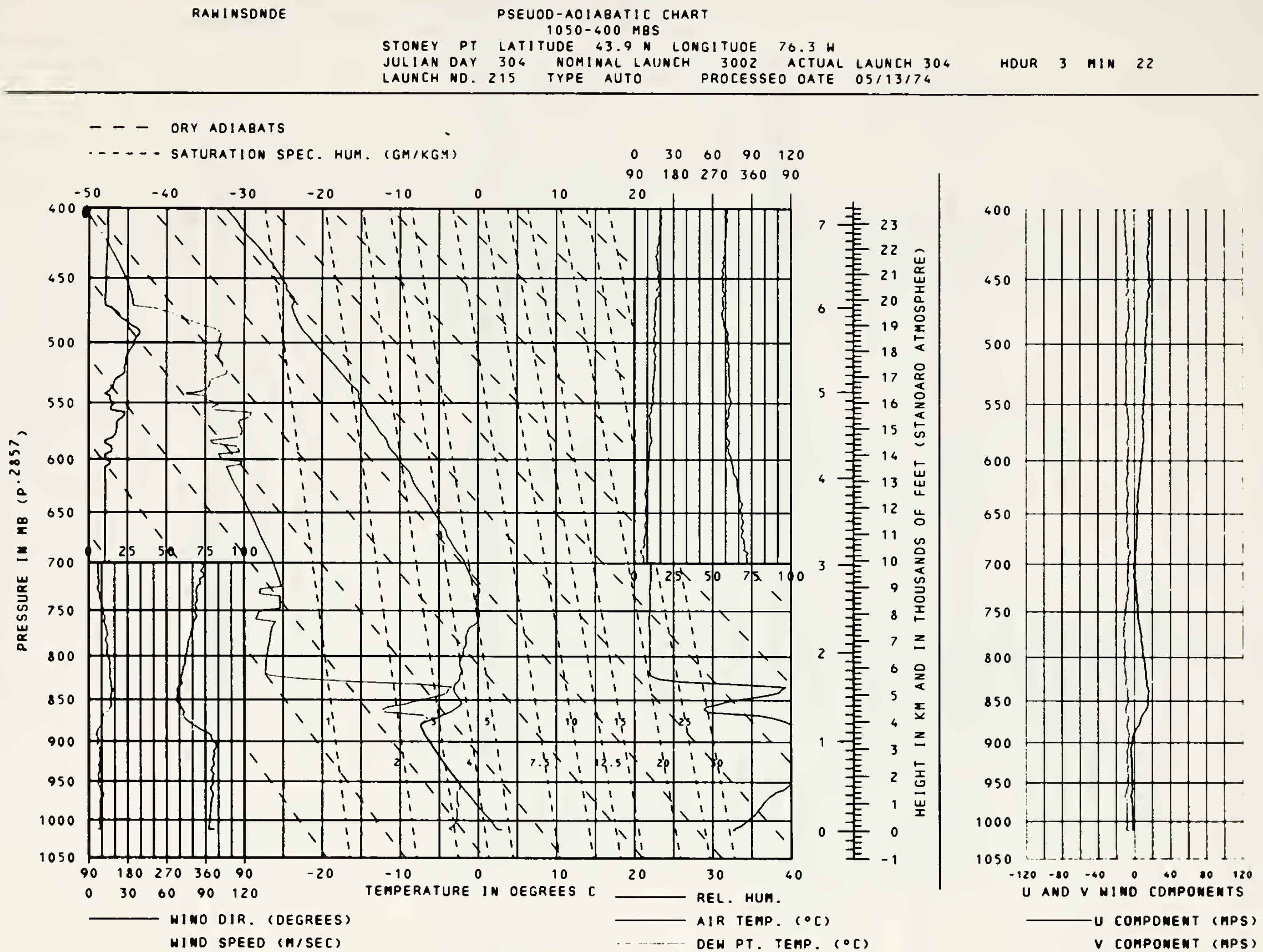


Figure 6.--Sample adiabatic chart.

4.1 Tape Format

Each observation consists of a variable number of 144 character records. The first 14 characters of each record are identifiers: station number, year, Julian day, hour, type and sequence number. The first 10 records include the following information:

Launch number
Type run (automated or manual)
Station name and coordinates
Nominal and actual release times
(Julian day, hour, minute)
Number of data points (NPTS)
Print image column headings

The tapes were generated using FORTRAN. Fields are right justified with high order positions blank filled.

The following notations are used:

x = any numeric or alphanumeric character
\- = an "11" punch in the card or the equivalent tape configuration
Δ = blank configuration on tape
Field = any position or group of positions used to describe an element

The data record is as follows:

	Stn #	Year	Jul day	Hour	Type	Seq no.	Time	Ind	Pressure	Ind	Temp	Ind	Rel humd	Ind	Spec humd	Ind
	xx	72	xxx	xx	x	xxxx	xxxxxx.x	xx	xxxxxx.x	xx	xxxxx.xx	xx	xxxxx.x	xx	xxxxx.x	xx
Field no.	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016

	Dew point	Ind	Latitude	Ind	Longitude	Ind	Height	Ind	U comp	Ind	V comp	Ind
	xxxx.xx	xx	xxxx.xxxxx	xx	xxxx.xxxxx	xx	xxxxxxx.	xx	xxxxx.x	xx	xxxxx.x	xx
Field no.	017	018	019	020	021	022	023	024	025	026	027	028

	Wind dir	Ind	Wind speed	Ind
	xxxxxx.x	xx	xxxxxx.x	xx
Field no.	029	030	031	032

Tape field number	Tape positions	Number characters	Element
001	01-02	2	Station number
002	03-04	2	Year
003	05-07	3	Julian day
004	08-09	2	Hour
005	10	1	Data type
006	11-14	4	Sequence number
007	15-22	8	Time
008	23-24	2	Time indicator
009	25-32	8	Pressure
010	33-34	2	Pressure indicator
011	35-42	8	Temperature
012	43-44	2	Temperature indicator
013	45-51	7	Relative humidity
014	52-53	2	Relative humidity indicator
015	54-60	7	Specific humidity
016	61-62	2	Specific humidity indicator
017	63-69	7	Dewpoint temperature
018	70-71	2	Dewpoint temperature indicator
019	72-81	10	Latitude
020	82-83	2	Latitude indicator
021	84-93	10	Longitude
022	94-95	2	Longitude indicator
023	96-103	8	Height
024	104-105	2	Height indicator
025	106-112	7	U component wind
026	113-114	2	U component wind indicator
027	115-122	7	V component wind
028	123-124	2	V component wind indicator
029	125-132	8	Wind direction
030	133-134	2	Wind direction indicator
031	135-142	8	Wind speed
032	143-144	2	Wind speed indicator

Tape field number	Element	Tape configuration	Remarks
001	Station number	3-8	Station number as follows: 3 = Stony Point, N.Y. 4 = Sodus Point, N.Y. 5 = Lakeside, N.Y. 6 = Confederation Park, O. 7 = Scarborough, O. 8 = Presqu'Ile Park, O.
002	Year	72	Year 72 = 1972.
003	Julian day	265-344	Julian day 265 = September 21, 1972.

Tape field number	Element	Tape configuration	Remarks
004	Hour	0-21	Hour, GMT, of scheduled release time.
005	Data type	1, 2, or 3	Data type indicator. 1 = 5-s data. 2 = PSTAR data (surface and each 10 mb thereafter). 3 = Standard levels (1000 mb level and each 50 mb thereafter).
006	Sequence number	1-9999	Sequence number within observation; 1 to 10 is header information; data begin with 11 and continue through NPTS + 10. NOTE: NPTS found in sequence number 7, positions 41-44.
007	Time	0.0-99999.9	Time from release in seconds to tenths.
008, 010, 012, 014, 016, 018, 020, 022, 024, 026, 028, 030, 032	Indicator	0 or 1	Indicates how value was obtained. 0 = Real or actual. 1 = Interpolated.
009	Pressure	0.0-1050.0	Pressure in millibars to tenths.
011	Temperature	-99.99-50.00, 999.00	Temperature in degrees Celsius to hundredths. 999.0 = Data not available.
017	Dewpoint temperature	-99.99-50.00, 999.00	Dewpoint temperature in degrees Celsius to hundredths. 999.0 = Data not available.
019	Latitude	42.00000-45.00000, 999.00000	North latitude in degrees to 10^{-5}. 999.00000 = Data not available.
021	Longitude	75.00000-82.00000, 999.00000	West longitude in degrees to 10^{-5}. 999.00000 = Data not available.
023	Height	0.-99999.	Height in whole geometric meters.

Tape field number	Element	Tape configuration	Remarks
025	U component of wind	-199.9-199.9, 999.0	U component of wind in meters per second to tenths. 999.0 = Data not available.
027	V component of wind	-199.9-199.9, 999.0	V component of wind in meters per second to tenths. 999.0 = Data not available.
029	Wind direction	0.0-360.0, 999.0	Wind direction in degrees to tenths. 999.0 = Data not available.
031	Wind speed	0.0-199.0, 999.0	Wind speed in meters per second to tenths. 999.0 = Data not available.

An inventory of the archived data is given in tables 4 through 8.

Table 4.--Inventory of time-series plots of raw data (Archive control No. USA 6-103-004)

Microfilm reel No.	Station		Date (1972)	
	No.	Name	Beginning	Ending
001	3	Stony Point	Sept. 21	Sept. 26
002	"	"	" 27	Oct. 5
003	"	"	Oct. 6	" 11
004	"	"	" 12	" 17
005	"	"	" 18	" 29
006	"	"	" 30	Nov. 4
007	"	"	Nov. 5	" 10
008	"	"	" 11	" 20
009	"	"	" 21	" 26
010	"	"	" 27	Dec. 2
011	"	"	Dec. 3	" 10
012	4	Sodus Point	Sept. 21	Sept. 26
013	"	"	" 27	Oct. 5
014	"	"	Oct. 6	" 11
015	"	"	" 12	" 17
016	"	"	" 19	" 29
017	"	"	" 30	Nov. 4
018	"	"	Nov. 5	" 10
019	"	"	" 11	" 20
020	"	"	" 21	" 26
021	"	"	" 27	Dec. 2
022	"	"	Dec. 3	" 10

Table 4.--Inventory of time-series plots of raw data (Archive control No. USA 6-103-004--continued)

Microfilm reel No.	Station No.	Station Name	Date (1972) Beginning	Date (1972) Ending
023	5	Lakeside Beach	Sept. 21	Sept. 26
024	"	"	" 27	Oct. 5
025	"	"	Oct. 6	" 11
026	"	"	" 12	" 17
027	"	"	" 19	" 29
028	"	"	" 30	Nov. 4
029	"	"	Nov. 5	" 10
030	"	"	" 11	" 20
031	"	"	" 21	" 26
032	"	"	" 27	Dec. 2
033	"	"	Dec. 3	" 10
034	6	Confederation Park	Sept. 21	Sept. 26
035	"	"	" 27	Oct. 5
036	"	"	Oct. 6	" 11
037	"	"	" 12	" 17
038	"	"	" 19	" 29
039	"	"	" 30	Nov. 4
040	"	"	Nov. 5	" 10
041	"	"	" 11	" 20
042	"	"	" 21	" 26
043	"	"	" 27	" 30
044	"	"	Dec. 3	Dec. 10
045	7	Scarborough	Sept. 21	Sept. 26
046	"	"	" 27	Oct. 5
047	"	"	Oct. 6	" 11
048	"	"	" 12	" 17
049	"	"	" 19	" 29
050	"	"	" 30	Nov. 4
051	"	"	Nov. 5	" 10
052	"	"	" 11	" 20
053	"	"	" 21	" 26
054	"	"	" 27	Dec. 2
055	"	"	Dec. 3	" 10
056	8	Presqu'Ile	Sept. 21	Sept. 26
057	"	"	" 26	Oct. 5
058	"	"	Oct. 6	" 11
059	"	"	" 12	" 17
060	"	"	" 17	" 29
061	"	"	" 30	Nov. 4
062	"	"	Nov. 4	" 10
063	"	"	" 11	" 20
064	"	"	" 21	" 26
065	"	"	" 27	Dec. 2
066	"	"	Dec. 3	" 10

Table 5.--Inventory of final 5-s data averages (Archive control No. USA 1-103-005)

Magnetic tape reel No.	Station No.	Station Name	Date (1972) Beginning	Date (1972) Ending
001	3	Stony Point	Sept. 21	Oct. 19
002	"	"	Oct. 20	Nov. 25
003	"	"	Nov. 26	Dec. 10
004	4	Sodus Point	Sept. 21	Oct. 28
005	"	"	Oct. 29	Nov. 27
006	"	"	Nov. 28	Dec. 10
007	5	Lakeside Beach	Sept. 21	Oct. 28
008	"	"	Oct. 29	Nov. 29
009	"	"	Nov. 30	Dec. 10
010	6	Confederation Park	Sept. 21	Oct. 26
011	"	"	Oct. 27	Dec. 4
012	"	"	Dec. 5	Dec. 10
013	7	Scarborough	Sept. 21	Oct. 31
014	"	"	Nov. 1	Dec. 2
015	"	"	Dec. 3	Dec. 10
016	8	Presqu'Ile	Sept. 21	Oct. 25
017	"	"	Oct. 26	Nov. 29
018	"	"	Nov. 30	Dec. 10

Table 6.--Inventory of final 10-mb data (Archive control No. USA 1-103-006)

Magnetic tape reel No.	Station No.	Date (1972)	to	Station No.	Date (1972)
001	3	Sept. 21		6	Sept. 21
002	6	" 23		8	Nov. 12
003	8	Nov. 13		"	Dec. 10

Table 7.--Inventory of final 50-mb data (Archive control No. USA 1-103-007)

Magnetic tape reel No.	Station No.	Date (1972)	to	Station No.	Date (1972)
001	. . . . All stations				

Table 8.--Inventory of final adiabatic charts (Archive control No. USA 6-103-008)

Microfilm reel No.	Station No.	Station Name	Date (1972) Beginning	Date (1972) Ending
001	3	Stony Point	Sept. 21	Sept. 26
002	"	"	" 27	Oct. 5
003	"	"	Oct. 6	" 11
004	"	"	" 12	" 17
005	"	"	" 18	" 29
006	"	"	" 30	Nov. 4
007	"	"	Nov. 5	" 10
008	"	"	" 11	" 20
009	"	"	" 21	" 26
010	"	"	" 27	Dec. 2
011	"	"	Dec. 3	" 10
012	4	Sodus Point	Sept. 21	Sept. 26
013	"	"	" 27	Oct. 5
014	"	"	Oct. 6	" 11
015	"	"	" 12	" 17
016	"	"	" 18	" 29
017	"	"	" 30	Nov. 4
018	"	"	Nov. 5	" 10
019	"	"	" 11	" 20
020	"	"	" 21	" 26
021	"	"	" 27	Dec. 2
022	"	"	Dec. 3	" 10
023	5	Lakeside Beach	Sept. 21	Sept. 26
024	"	"	" 27	Oct. 5
025	"	"	Oct. 6	" 11
026	"	"	" 12	" 17
027	"	"	" 18	" 29
028	"	"	" 30	Nov. 4
029	"	"	Nov. 5	" 10
030	"	"	" 11	" 20
031	"	"	" 21	" 26
032	"	"	" 27	Dec. 2
033	"	"	Dec. 3	" 10
034	6	Confederation Park	Sept. 21	Sept. 26
035	"	"	" 27	Oct. 5
036	"	"	Oct. 6	" 11
037	"	"	" 12	" 17
038	"	"	" 18	" 29
039	"	"	" 30	Nov. 4
040	"	"	Nov. 5	" 10
041	"	"	" 11	" 20
042	"	"	" 21	" 26
043	"	"	Sept. 27	Dec. 2
044	"	"	Nov. 27	" 10

Table 8.--Inventory of final adiabatic charts (Archive control No. USA 6-103-008--continued)

Microfilm reel No.	Station		Date (1972)	
	No.	Name	Beginning	Ending
045	7	Scarborough	Sept. 21	Sept. 26
046	"	"	" 27	Oct. 5
047	"	"	Oct. 6	" 11
048	"	"	" 12	" 17
049	"	"	" 18	" 29
050	"	"	" 30	Nov. 4
051	"	"	Nov. 5	" 10
052	"	"	" 11	" 20
053	"	"	" 21	" 26
054	"	"	" 27	Dec. 2
055	"	"	Dec. 3	Dec. 10
056	8	Presqu'Ile	Sept. 21	Sept. 26
057	"	"	" 27	Oct. 5
058	"	"	Oct. 6	" 11
059	"	"	" 12	" 17
060	"	"	" 18	" 29
061	"	"	" 30	Nov. 4
062	"	"	Nov. 5	Nov. 10
063	"	"	" 11	" 20
064	"	"	" 21	" 26
065	"	"	" 27	Dec. 2
066	"	"	Dec. 3	" 10

4.2 Material in Temporary Storage

The output of the TRANS program, which was used as input to the EDIT program, will be held in the archive for a period of 5 years. The data format is as follows:

800 BPI - CDC scope internal format - labelled tape.
File 1 - 80 character label - in display code.
File 2 - and subsequent files (all floating point).
Record 1 - flight header information.
Record 2 - baroswitch calibration.
Record 3 - first 100 cycles of data, where a cycle consists of time, high reference, pressure, temperature, humidity at approximately 0.8-s intervals; all values except time in frequencies.
Record n - last record with meteorological data (-1.fill)
Record n+1 - first 400 records of Cape Fear-Nantucket time differences (2-s intervals).
Record n+2 - first 400 records of Cape Fear-Dana time differences (2-s intervals).

Record n+3 - second 400 records of Cape Fear-Nantucket time differences.

Record n+4 - second 400 records of Cape Fear - Dana time differences, and so on, to the end of the flight.

An end-of-file follows each sounding, and a double end-of-file marks the end of the last sounding.

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APPENDIX

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
		QUESTIONABLE SURFACE VALUES			
3	291	October	17	1200	all
4	282	"	8	0000	all
5	281	"	7	2100	all
8	269	September	25	0600	all
		QUESTIONABLE TEMPERATURE DATA			
3	267	September	23	0300	sfc-995
"	268	"	24	0600	all
"	271	"	27	0000	410
"	276	October	2	1800	140-137
"	278	"	4	0600	sfc-815, 630-610
"	279	"	5	1800	175-end
"	281	"	7	1200	sfc-970
"	"	"	"	1500	280
"	282	"	8	0000	sfc-975
"	"	"	"	1200	137
"	283	"	9	0000	200
"	284	"	10	0600	535
"	"	"	"	1800	250-end
"	285	"	11	1200	970-800, 180-30
"	"	"	"	1500	710
"	286	"	12	0600	270
"	"	"	"	1200	115
"	"	"	"	1800	210-end
"	287	"	13	0300	795
"	"	"	"	2100	570
"	288	"	14	0600	115
"	"	"	"	1500	625
"	"	"	"	1800	612
"	289	"	15	1800	140, 90
"	290	"	16	1200	615-590
"	"	"	"	1500	773-760
"	"	"	"	1800	601-525
"	291	"	17	0300	725-700
"	"	"	"	1200	all
"	"	"	"	1800	80-end
"	292	"	18	1800	245
"	297	"	23	0000	405-end
"	"	"	"	1200	sfc-995
"	298	"	24	0000	200-194
"	300	"	26	1200	145

QUESTIONABLE TEMPERATURE DATA (Continued)

Station No.	Julian day	Date (1972)		Launch time(GMT)	Height (mb)
3	304	October	30	1500	sfc-990
"	"	"	"	1800	219-end
"	306	November	1	1200	173
"	"	"	"	1800	222
"	307	"	2	0600	sfc-995
"	"	"	"	0900	sfc-998
"	308	"	3	1800	240-end
"	311	"	6	0300	1020-1004
"	"	"	"	1800	105-102
"	312	"	7	1200	1014-995
"	313	"	8	0900	997-994
"	314	"	9	0300	996-989
"	315	"	10	0300	1013-996
"	"	"	"	1200	200-105
"	317	"	12	0600	420-425
"	318	"	13	1200	5° warmer
"	319	"	14	0600	130
"	"	"	"	1200	202, 115, 105-100
"	320	"	15	1200	280, 255, 170, 160
"	321	"	16	0000	240
"	324	"	19	1200	190
"	326	"	21	1200	300-end
"	"	"	"	1800	141
"	327	"	22	1200	290, 137-130
"	329	"	24	0600	264
"	"	"	"	1200	189
"	"	"	"	1500	592
"	330	"	25	0600	860
"	331	"	26	0000	250-238, 84
"	"	"	"	0600	462-456
"	"	"	"	1200	sfc-950, 238
"	332	"	27	0000	976-962
"	"	"	"	1500	989-965
"	"	"	"	1800	all
"	333	"	28	0000	265-255
"	335	"	30	0300	all
"	"	"	"	0600	310-240
"	336	December	1	0600	340-335
"	337	"	2	0600	205-135
"	"	"	"	2100	373-368
"	339	"	4	0300	all
"	340	"	5	0000	95
"	"	"	"	1200	975
"	341	"	6	0300	1002, 1000-960
"	342	"	7	0000	370-350
"	"	"	"	0600	140

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
		QUESTIONABLE TEMPERATURE DATA (Continued)			
3	342	December	7	2100	all
"	344	"	9	0000	240
"	"	"	"	0600	185
"	"	"	"	1200	801-end
4	272	September	28	0000	875
"	273	"	29	1200	400-350
"	274	"	30	1200	160, 54
"	276	October	2	1800	112-108
"	278	"	4	1800	320-175
"	281	"	7	0600	910-790
"	"	"	"	1200	650-625, 400-375
"	"	"	"	1500	700-end
"	"	"	"	1800	225-190, 100-end
"	282	"	8	0000	all
"	283	"	9	0300	200-175
"	"	"	"	0600	275
"	"	"	"	1800	480-445, 300, 112
"	284	"	10	0600	280-225
"	288	"	14	1800	sfc-825, 625-590
"	290	"	16	2100	425-410
"	293	"	19	0000	158
"	294	"	20	1200	242
"	295	"	21	1200	330
"	297	"	23	1200	250-end
"	299	"	25	0000	365-end
"	"	"	"	1200	113
"	304	"	30	1200	186
"	307	November	2	1500	653-end
"	309	"	4	0000	185
"	310	"	5	0300	710-690
"	312	"	7	0300	1017-1002
"	313	"	8	1200	122-120
"	317	"	12	2100	860-850, 560-450
"	318	"	13	1800	92
"	322	"	17	0000	150
"	325	"	20	1200	350 must be burst pt (data abv are down-track)
"	326	"	21	0000	352-345
"	327	"	22	0300	560, 426-431
"	329	"	24	0000	300, 165, 132
"	331	"	26	0300	175
"	"	"	"	1200	400-350
"	"	"	"	1500	865-840
"	333	"	28	0600	860-850
"	"	"	"	1800	100-96

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
		QUESTIONABLE TEMPERATURE DATA (Continued)			
4	334	November	29	0300	430-425
"	338	December	3	0000	430, 420, 180
"	340	"	5	1500	626-end
"	343	"	8	0000	135, 125
"	"	"	"	1800	112
"	344	"	9	1200	490-410
"	"	"	"	1800	160, 130
5	271	September	27	1200	sfc-990
"	272	"	28	1200	300-240
"	276	October	2	0600	480-450
"	279	"	5	1800	100-end
"	280	"	6	0600	240-230
"	"	"	"	1800	160
"	281	"	7	0000	990
"	"	"	"	0600	50-48
"	"	"	"	2100	all
"	283	"	9	1200	825
"	"	"	"	1800	345-200
"	286	"	12	0000	255-240
"	"	"	"	0600	160, 110
"	"	"	"	1500	sfc-750
"	"	"	"	2100	250
"	287	"	13	0600	110
"	"	"	"	1200	340
"	"	"	"	1500	310
"	288	"	14	1800	240, 225
"	289	"	15	0000	220
"	290	"	16	1800	all
"	"	"	"	2100	700-end
"	291	"	17	1800	205
"	292	October	18	1800	240
"	295	"	21	0000	333
"	297	"	23	0000	290, 245
"	"	"	"	1200	226, 204
"	299	"	25	0000	sfc-480
"	303	"	29	1200	204, 198
"	306	November	1	0000	406-391, 248-243, 178
"	"	"	"	1800	104
"	307	"	2	1200	433, 204
"	"	"	"	1800	154, 107
"	308	"	3	1800	111
"	310	"	5	0600	861-853

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)

QUESTIONABLE TEMPERATURE DATA (Continued)

"	"	"	"	0900	795-775
"	311	"	6	1800	240, 157, 130
"	312	"	7	0600	112
"	313	"	8	0900	625-482
"	317	"	12	1800	150
"	318	"	13	1800	210, 120
"	325	"	20	1200	870
"	326	"	21	1800	182
"	332	"	27	0000	955-910
"	"	"	"	1200	130-110
"	333	"	28	1800	265-258
"	334	"	29	0000	660-635
"	335	"	30	1800	140-130
"	338	December	3	0900	670-650
"	"	"	"	1200	840-830
"	"	"	"	1800	108-105
"	"	"	"	2100	415-400
"	339	"	4	0900	1016-1009
"	340	"	5	0300	515-end
"	"	"	"	0900	114
"	"	"	"	1800	503-end
"	341	"	6	0900	142
"	342	"	7	0600	all
"	"	"	"	0900	164, 125-123
"	343	"	8	1800	106
6	267	September	23	2100	275-250
"	268	"	24	1200	520-510
"	269	"	25	1500	390
"	"	"	"	1800	190-175
"	271	"	27	0000	970-950
"	272	"	28	0000	72-68
"	282	October	8	1200	112
"	"	"	"	1800	325
"	283	"	9	1200	205-200
"	"	"	"	2100	100
"	284	"	10	0600	224
"	285	"	11	1800	187
"	287	"	13	0600	255-240
"	289	"	15	1800	105
"	290	"	16	1200	185-178
"	"	"	"	1800	162-155
"	291	"	17	1200	105
"	292	"	18	0000	269

QUESTIONABLE TEMPERATURE DATA (Continued)

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
6	293	October	19	1200	185, 158
"	294	"	20	1200	122, 67
"	295	"	21	1200	176
"	298	"	24	1200	162
"	300	"	26	1200	130
"	303	"	29	1200	175
"	306	November	1	1800	248
"	307	"	2	0000	350
"	"	"	"	0900	629
"	309	"	4	0600	114
"	"	"	"	1200	176
"	311	"	6	2100	208-204
"	312	"	7	0000	234-229
"	"	"	"	0300	457-443
"	313	"	8	0000	367-364
"	314	"	9	1200	185-181
"	315	"	10	1800	117-114
"	316	"	11	0300	473-464
"	317	"	12	0000	1009-940
"	"	"	"	1500	811-800
"	"	"	"	2100	828-821
"	318	"	13	0000	795-790
"	"	"	"	0600	370
"	"	"	"	1200	150-145
"	319	"	14	1200	1002-995
"	"	"	"	2100	442-435
"	320	"	15	0000	677-597
"	321	"	16	0000	1012-997
"	323	"	18	1200	845, 795
"	324	"	19	1200	136-126
"	326	"	21	1200	322, 309
"	"	"	"	2100	326
"	328	"	23	1200	122
"	329	"	24	0000	172
"	"	"	"	1200	500
"	330	"	25	0600	119
"	333	"	28	0600	860-840
"	335	"	30	0000	180-175
"	"	"	"	0300	300-265
"	"	"	"	0600	380-375
"	337	December	2	0600	920-905
"	339	"	4	1200	477, 464
"	342	"	7	0300	sfc-1000
"	"	"	"	0600	411-end

QUESTIONABLE TEMPERATURE DATA (Continued)

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
7	270	September	26	0000	176, 157, 66
"	271	"	27	1200	75
"	272	"	28	0000	65
"	276	October	2	0000	204-200
"	279	"	5	1500	170
"	283	"	9	1800	58
"	284	"	10	0000	210, 135
"	285	"	11	1200	185
"	286	"	12	0000	150
"	"	"	"	0900	120
"	287	"	13	1500	360
"	"	"	"	1800	510-500, 250-225
"	288	"	14	1200	210-190
"	"	"	"	1800	255
"	289	"	15	0300	420-410
"	"	"	"	0600	170
"	"	"	"	2100	185
"	290	"	16	0000	310-265, 70
"	291	"	17	0300	735
"	"	"	"	0900	722-end
"	"	"	"	1800	920-905
"	292	"	18	0000	225
"	294	"	20	0000	203, 130
"	"	"	"	1200	320-250
"	295	"	21	1200	128-end
"	297	"	23	1200	195-end
"	298	"	24	1200	sfc-850, 620-end
"	300	"	26	1200	235
"	305	"	31	0600	214-202
"	"	"	"	1200	162, 135
"	306	November	1	1200	175
"	308	"	3	1200	110
"	"	"	"	1500	272, 242
"	309	"	4	0000	130
"	310	"	5	0600	860-845
"	311	"	6	0000	145-142
"	"	"	"	0300	287-279
"	"	"	"	1200	126-123
"	"	"	"	1800	191-187
"	312	"	7	0000	1008-958
"	"	"	"	0600	229-78
"	313	"	8	1200	220-165
"	314	"	9	0300	992-907
"	315	"	10	1800	865-850

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
		QUESTIONABLE TEMPERATURE DATA (Continued)			
7	316	November	11	0300	695-680, 513-465, 387-358
"	"	"	"	2100	628-618
"	317	"	12	0900	818-810
"	"	"	"	2100	810-800, 770-765
"	318	"	13	0000	806-800
"	"	"	"	0300	797-792
"	"	"	"	0900	785-735, 420-370
"	"	"	"	1500	785-700
"	319	"	14	0000	327-318
"	"	"	"	0300	811-805
"	"	"	"	0600	474-469
"	"	"	"	2100	all
"	320	"	15	0000	646-639
"	321	"	16	1200	90-70
"	324	"	19	0000	608-597
"	326	"	21	1800	130, 85
"	327	"	22	1800	158, 120
"	329	"	24	1200	178-154
"	330	"	25	1200	73
"	335	"	30	0600	140-135
"	"	"	"	1200	140-130
"	336	December	1	1500	980-972, 900-545
"	337	"	2	1200	420-380
"	338	"	3	0300	all
"	"	"	"	0600	305-288
"	340	"	5	0900	581-end
"	345	"	10	2100	962-904
8	269	September	25	0300	378
"	270	"	26	0000	129
"	277	October	3	0900	360-345
"	279	"	5	1200	160, 85
"	281	"	7	0600	110
"	"	"	"	1200	65
"	283	"	9	2100	300-290
"	284	"	10	0300	370, 110
"	"	"	"	1500	all
"	287	"	13	0300	830-780
"	"	"	"	1200	70
"	"	"	"	2100	250-240, 220-200
"	288	"	14	1800	90-80, 64-60
"	289	"	15	1200	90
"	"	"	"	1800	228

QUESTIONABLE TEMPERATURE DATA (Continued)

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
8	290	October	16	0900	300-260
"	291	"	17	0300	720
"	"	"	"	1500	475
"	292	"	18	1200	200-end
"	295	"	21	0000	70
"	297	"	23	0000	sfc-500
"	300	"	26	0000	140
"	301	"	27	0000	200
"	304	"	30	1800	204, 136-end
"	306	November	1	0000	400
"	"	"	"	0600	192-164
	307	"	2	0000	182-180
"	"	"	"	0600	83-80
"	308	"	3	1800	130, 115
"	309	"	4	1200	120
"	"	"	"	1800	112
"	310	"	5	1500	420-405
"	311	"	6	0600	136-132
"	312	"	7	0600	120-60
"	314	"	9	0600	115-110
"	"	"	"	0900	355-335
"	315	"	10	0000	860-770, 585-560, 505-480
"	"	"	"	0600	90
"	317	"	12	0300	820-810
"	318	"	13	2100	805-795
"	319	"	14	0600	307-302
"	321	"	16	0000	995-980, 165-160
"	"	"	"	1200	1020-1010
"	326	"	21	1800	250-190
"	327	"	22	0600	588-575
"	"	"	"	1500	390-end
"	"	"	"	2100	325-307
"	328	"	23	1800	240
"	329	"	24	1800	228
"	332	"	27	1800	75-65
"	333	"	28	0600	160-147
"	"	"	"	1200	135-125
"	335	"	30	1200	80-75
"	339	December	4	0900	sfc-990
"	"	"	"	1200	725-650

QUESTIONABLE MOISTURE VALUES

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
3	267	September	23	0300	sfc-995
"	268	"	24	0600	all
"	277	October	3	0600	325-68
"	278	"	4	0600	sfc-815, 630-610
"	281	"	7	1200	sfc-970
"	282	"	8	0000	sfc-975
"	285	"	11	1500	710
"	286	"	12	0600	360-273
"	289	"	15	1800	353
"	290	"	16	0900	750-700
"	"	"	"	1800	601-525
"	291	"	17	1200	all
"	"	"	"	1800	340-end
"	297	"	23	0000	465-end
"	"	"	"	1200	sfc-995
"	304	"	30	1500	sfc-990
"	307	November	2	0600	sfc-995
"	"	"	"	0900	sfc-950
"	308	"	3	1200	253
"	311	"	6	0300	1020-1004
"	"	"	"	1800	325-104
"	312	"	7	1200	1014-995
"	313	"	8	0900	997-994
"	314	"	9	0300	996-989
"	315	"	10	0300	1013-996
"	319	"	14	0600	313-end
"	"	"	"	1200	319-end
"	324	"	19	1200	363-end
"	326	"	21	1200	370-end
"	331	"	26	0000	332-end
"	"	"	"	1200	sfc-950
"	332	"	27	0000	976-962
"	"	"	"	1500	989-965
"	"	"	"	1800	all
"	333	"	28	0000	409-255
"	335	"	30	0600	363-240
"	336	December	1	0600	370-355
"	337	"	2	0600	446-135
"	"	"	"	2100	373-368
"	338	"	3	0000	sfc-660
"	339	"	4	0300	all
"	340	"	5	1200	975
"	341	"	6	0300	1000-960
"	342	"	7	1500	400, 390

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
		QUESTIONABLE MOISTURE VALUES (Continued)			
3	342	December	7	1800	370
"	"	"	"	2100	all
"	344	"	9	0000	330
"	"	"	"	1200	801-end
"	"	"	"	1500	670-660
4	273	September	29	1200	400-350
"	276	October	2	1800	112-108
"	278	"	4	1800	320-175
"	281	"	7	0600	910, 790
"	"	"	"	1200	650-625, 400-375
"	"	"	"	1500	700-end
"	282	"	8	0000	all
"	283	"	9	0600	275
"	"	"	"	1800	480-445, 300, 112
"	284	"	10	0600	280-225
"	288	"	14	1800	sfc-825, 625-590
"	295	"	21	1200	330
"	299	"	25	0000	360-354
"	307	November	2	1500	653-end
"	310	"	5	0300	710-690
"	312	"	7	0300	1017-1002
"	315	"	10	0600	370-120
"	317	"	12	2100	860-850, 560-450
"	322	"	17	0000	365-end
"	325	"	20	1200	396-end
"	326	"	21	0000	374-end
"	329	"	24	0000	372-end
"	331	"	26	1200	400-350, 327-end
"	"	"	"	1500	865-840
"	333	"	28	0600	860-850
"	334	"	29	0300	430-425
"	338	December	3	0000	430, 420, 180
5	270	September	26	1800	325-310
"	272	"	28	1200	300-240
"	276	October	2	0600	480-450
"	280	"	6	0600	300-230
"	"	"	"	0900	670-620
"	281	"	7	0000	990
"	"	"	"	2100	all
"	282	"	8	0300	770-700
"	283	"	9	1800	345-200
"	286	"	12	1500	sfc-750
"	"	"	"	2100	375-250
"	290	"	16	1800	sfc-850

QUESTIONABLE MOISTURE VALUES (Continued)

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
5	290	October	16	2100	700-end
"	291	"	17	1800	345-205
"	"	"	"	2100	470
"	295	"	21	0000	340-333
"	298	"	24	0000	288
"	299	"	25	0000	sfc-480
"	305	"	31	1800	291
"	306	November	1	0000	292-end
"	308	"	3	1800	325-end
"	310	"	5	0600	861-853
"	"	"	"	0900	795-775
"	311	"	6	1800	322-103
"	312	"	7	0600	112
"	313	"	8	0900	625-482
"	319	"	14	0300	all
"	325	"	20	1200	870, 636, 552
"	332	"	27	0000	955-910
"	"	"	"	1200	406-112
"	333	"	28	1800	398-258
"	335	"	30	1800	344-130
"	338	December	3	1200	840-830
"	"	"	"	2100	415-400
"	339	"	4	0900	1016-1009
"	340	"	5	0300	515-end
"	"	"	"	0900	114
"	"	"	"	1800	503-end
"	342	"	7	0600	all
"	"	"	"	0900	125-123
6	271	September	27	0000	970-950
"	282	October	8	1800	325
"	283	"	9	1200	332-200
"	288	"	14	0000	550-450
"	306	November	1	1800	288-end
"	307	"	2	0900	629
"	308	"	3	0000	533, 529
"	311	"	6	2100	323-204
"	312	"	7	0000	318-228
"	"	"	"	0300	457-443
"	316	"	11	0300	473-464
"	"	"	"	0900	793, 679-659, 654
"	317	"	12	0000	1009-940
"	"	"	"	1500	811-800
"	"	"	"	2100	828-821
"	318	"	13	0000	795-790

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
		QUESTIONABLE MOISTURE VALUES (Continued)			
6	319	November	14	1200	1002-955
"	"	"	"	2100	442-435
"	320	"	15	0000	677-597
"	321	"	16	0000	1012-997
"	323	"	18	1200	845, 795
"	328	"	23	1200	378-end
"	330	"	25	0600	356-end
"	333	"	28	0600	860-840
"	335	"	30	0300	370-275
"	337	December	2	0600	920-905
"	339	"	4	1200	477, 464
"	342	"	7	0300	sfc-1000
"	"	"	"	0600	411-end
7	273	September	29	0000	650-end
"	276	October	2	0000	204-200
"	283	"	9	0600	380
"	287	"	13	1500	360
"	"	"	"	1800	510-500
"	291	"	17	0900	722-end
"	"	"	"	1800	920-905
"	298	"	24	1200	sfc-850, 620-end
"	300	"	26	1200	335-end
"	305	"	31	0600	309-end
"	306	November	1	1200	293-end
"	308	"	3	1500	316-end
"	309	"	4	0000	327-end
"	"	"	"	0600	318-end
"	310	"	5	0600	860-845
"	312	"	7	0000	1008-958
"	313	"	8	1200	310-165
"	314	"	9	0300	992-907
"	316	"	11	0300	695-680, 513-465, 387-358
"	"	"	"	2100	628-618
"	317	"	12	0900	818-810
"	"	"	"	2100	810-800, 770-765
"	318	"	13	0000	806-800
"	"	"	"	0300	797-792
"	"	"	"	0900	785-735
"	"	"	"	1500	785-700
"	319	"	14	0000	327-318
"	"	"	"	0300	811-805
"	"	"	"	0600	474-469
"	"	"	"	2100	all

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)

QUESTIONABLE MOISTURE VALUES (Continued)

7	320	November	15	0000	646-639
"	"	"	"	1200	998-980
"	321	"	16	1200	90-70, 369-end
"	323	"	18	1200	432-367
"	324	"	19	0000	1006-994, 608-597
"	327	"	22	1800	415-end
"	329	"	24	1200	347-end
"	330	"	25	1200	346-end
"	334	"	29	1200	400-375
"	335	"	30	1200	377-137
"	336	December	1	1500	980-972, 900-545
"	337	"	2	1200	420-190
"	338	"	3	0600	355-end
"	340	"	5	0900	581-end
"	345	"	10	2100	962-904
8	269	September	25	0300	sfc, 378-373
"	"	"	"	0600	sfc
"	"	"	"	0900	sfc
"	"	"	'	1500	sfc
"	274	"	30	1200	281
"	277	October	3	0900	360-345
"	279	"	5	1200	160, 85
"	283	"	9	0600	390-300
"	"	"	"	1200	370-270
"	"	"	"	2100	340-290
"	284	"	10	1500	all
"	287	"	13	0300	830-780
"	"	"	"	2100	311-end
"	297	"	23	0000	sfc-500
"	304	"	30	1800	330-end
"	306	November	1	0600	289-end
"	307	"	2	0000	182-180
"	"	"	"	0600	82
"	309	"	4	1200	700-end
"	310	"	5	1500	420-405
"	321	"	16	0000	995-980
"	"	"	"	1200	1020-1010
"	322	"	17	0000	1015-1000
"	326	"	21	1800	377-end
"	327	"	22	1500	410-end
"	"	"	"	2100	431-end
"	328	"	23	1800	381-end
"	332	"	27	1800	406-68
"	339	December	4	0900	sfc-990
"	"	"	"	1200	725-650

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)

QUESTIONABLE WIND DATA

3	266	September	22	0000	all
"	"	"	"	0600	950-850
"	267	"	23	1500	sfc-930
"	268	"	24	0600	all
"	"	"	"	1800	all
"	269	"	25	0000	all
"	"	"	"	0300	600-590
"	"	"	"	1500	920-875
"	272	"	28	0000	538-510
"	"	"	"	1200	920-900
"	275	October	1	0000	290-200
"	277	"	3	0000	150-end
"	"	"	"	0600	100-end
"	278	"	"	0600	sfc-815, 630-610
"	280	"	6	0000	all
"	281	"	7	0900	all
"	"	"	"	1500	all
"	282	"	8	0600	sfc-950
"	"	"	"	2100	465-440
"	283	"	9	1200	all
"	286	"	12	0600	340-320
"	"	"	"	1800	210-end
"	288	"	14	0000	all
"	289	"	15	0000	475
"	290	"	16	0300	all
"	"	"	"	1800	all
"	291	"	17	1200	all
"	"	"	"	1500	all
"	292	"	18	0300	550, 525
"	303	"	29	0000	all
"	306	November	1	0600	all
"	307	"	2	1200	all
"	308	"	3	0900	951-913
"	309	"	4	0600	all
"	309	"	4	0900	972
"	310	"	5	1800	970-960
"	311	"	6	2100	all
"	313	"	8	0000	230-150
"	"	"	"	0600	125-54
"	315	"	10	2100	1008-974
"	316	"	11	0000	all
"	317	"	12	1200	880
"	"	"	"	2100	970-910
"	322	"	17	0000	975-950

QUESTIONABLE WIND DATA (Continued)

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
3	326	November	21	1200	690
"	"	"	"	1500	all
"	328	"	23	2100	all
"	329	"	24	1200	all
"	"	"	"	1800	all
"	331	"	26	1500	all
"	332	"	27	0000	976-962
"	"	"	"	0600	280-119
"	"	"	"	1200	150-127
"	333	"	28	0600	500-450
"	334	"	29	1200	450-400
"	"	"	"	1500	all
"	335	"	30	0000	all
"	"	"	"	1800	all
"	336	December	1	0600	all
"	340	"	5	1200	975
"	341	"	6	0300	1000--960
"	"	"	"	0600	140-end
"	344	"	9	1200	801-end
"	345	"	10	0300	Rapid fluctuation of all
4	270	September	26	2100	520-500
"	274	"	30	1200	160, 54
"	279	October	5	0300	610-585
"	281	"	7	1200	650-end
"	"	"	"	1500	700-end
"	282	"	8	0000	all
"	283	"	9	1800	480-445, 300, 112 sfc-900
"	284	"	10	0600	280-225
"	285	"	11	0600	180-160
"	286	"	12	0900	435
"	"	"	"	2100	sfc-970, 350
"	289	"	15	1800	935
"	290	"	16	0900	1000-920
"	"	"	"	1500	1000-950
"	304	"	30	1200	900
"	305	"	31	0600	all
"	"	"	"	2100	all
"	306	November	1	0300	all
"	307	"	2	1500	653-end
"	310	"	5	0000	all
"	"	"	"	0300	all
"	"	"	"	0900	all

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
		QUESTIONABLE WIND DATA (Continued)			
4	310	November	5	1200	all
"	"	"	"	1500	all
"	311	"	6	0600	260-90
"	"	"	"	1200	695-665
"	"	"	"	2100	1018-950
"	312	"	7	0900	800-770
"	313	"	8	0300	950-900
"	"	"	"	0600	390-220
"	"	"	"	1800	130-100
"	314	"	9	0300	all
"	"	"	"	1800	770-725, 330-270
"	315	"	10	1800	150-95
"	316	"	11	0000	500-460
"	317	"	12	1500	645-630
"	"	"	"	2100	515-500
"	319	"	14	0600	Speed 500-end erratic
"	321	"	16	0000	715
"	325	"	20	1200	350 must be burst pt (data abv are downtrack)
"	326	"	21	0600	all
"	327	"	22	1800	973-970
"	328	"	23	0000	498
"	"	"	"	0900	500
"	330	"	25	0600	485-470
"	331	"	26	0600	all
"	"	"	"	1200	380-375
"	334	"	29	0000	448-444
"	"	"	"	2100	1021-840
"	335	"	30	0000	470-440
"	340	December	5	1500	626-end
5	267	September	23	1500	325
"	272	"	28	1200	300-240, 236, 213
"	273	"	29	0000	all
"	277	October	3	0000	sfc-620
"	278	"	4	0900	all. Rate of ascent
"	281	"	7	2100	all
"	283	"	9	1200	sfc-975
"	289	"	15	0000	220
"	290	"	16	1200	all
"	305	"	31	0600	all
"	306	November	1	0600	all

QUESTIONABLE WIND DATA (Continued)

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
5	306	November	1	1200	all
"	311	"	6	0900	630-600
"	312	"	7	0900	720-440
"	313	"	8	0600	all
"	320	"	15	0000	all
"	326	"	21	2100	all
"	332	"	27	1800	all
"	334	"	29	0600	all
"	"	"	"	1800	all
"	336	December	1	0000	125-110
"	337	"	2	1200	320-315
"	338	"	3	0000	all
"	"	"	"	1200	700-650
"	339	"	4	0900	1016-1009
"	"	"	"	1800	440-400
"	340	"	5	0900	all
"	341	"	6	0900	all
"	342	"	7	0600	all
"	343	"	8	0000	all
"	"	"	"	1800	105-99
"	344	"	9	0600	all
6	267	September	23	0300	910-900
"	"	"	"	0600	940
"	"	"	"	0900	875
"	"	"	"	1200	840
"	271	"	27	1200	60-50
"	282	October	8	0300	650-620
"	"	"	"	1800	all
"	283	"	9	2100	all
"	290	"	16	2100	760
"	291	"	17	0600	355
"	"	"	"	1800	all
"	297	"	23	0000	560-540
"	303	"	29	1200	178
"	306	November	1	1800	all
"	309	"	4	1200	all
"	314	"	9	1500	125-104
"	315	"	10	0600	150-107
"	"	"	"	0900	650-550
"	317	"	12	1800	all
"	319	"	14	1500	sfc-900
"	326	"	21	0300	342-346
"	"	"	"	1800	all
"	328	"	23	0000	490-450

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
		QUESTIONABLE WIND DATA (Continued)			
6	328	November	23	0300	359-332
"	330	"	25	0600	119
"	332	"	27	1800	180-175
"	333	"	28	0300	410-390
"	335	"	30	0300	all
"	"	"	"	0600	all
"	"	"	"	1500	330-320
"	337	December	2	0600	320-300
"	342	"	7	0900	all
7	281	October	7	0300	450-end
"	"	"	"	1500	870
"	284	"	10	0600	all
"	285	"	11	1800	90-end
"	288	"	14	1500	all
"	289	"	15	0300	all
"	291	"	17	0600	540, 425
"	311	November	6	0600	100-52
"	"	"	"	0900	695-685
"	"	"	"	1200	200-123
"	312	"	7	0000	1008-958
"	313	"	8	0000	340-330
"	314	"	9	0300	992-907
"	"	"	"	0600	115-62
"	315	"	10	0600	310-290
"	317	"	12	0600	225-200
"	"	"	"	0900	775-750
"	"	"	"	1200	540-530
"	318	"	13	0600	930-850
"	319	"	14	0300	250-175
"	"	"	"	2100	all
"	325	"	20	0000	332-303
"	327	"	22	1800	160
"	328	"	23	0000	600-550
"	329	"	24	0000	588-175
"	332	"	27	1200	535-480
"	333	"	28	0600	80-65
"	334	"	29	1800	75-65
"	335	"	30	1500	250-235
"	336	December	1	1500	980-972
"	337	"	2	1500	220-208
"	338	"	3	1200	all
"	345	"	10	1500	all
8	269	September	25	1300	402-386
"	273	"	29	0000	all
"	281	October	7	0900	620-570

QUESTIONABLE WIND DATA (Continued)

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
8	282	October	8	0300	370
"	284	"	10	0300	all
"	"	"	"	1500	sfc-950
"	285	"	11	0300	310-260
"	286	"	12	1200	sfc-780
"	287	"	13	0300	830-780
"	"	"	"	0600	90-80
"	"	"	"	0900	sfc-780
"	"	"	"	1200	sfc-900
"	290	"	16	0600	all
"	293	"	19	0000	100
"	302	"	28	0000	90
"	304	"	30	0300	all
"	"	"	"	2100	all
"	305	"	31	2100	all
"	307	November	2	1800	all
"	309	"	4	1200	all
"	310	"	5	1500	all
"	"	"	"	1800	215-190
"	311	"	6	1200	100-70
"	312	"	7	1200	100-48
"	313	"	8	1200	all
"	314	"	9	0600	125-100
"	"	"	"	0900	320-271
"	"	"	"	1200	all
"	"	"	"	1500	650-550
"	315	"	10	0000	100-461
"	"	"	"	0600	80-47
"	319	"	14	0000	150-60
"	322	"	17	0000	200-160
"	327	"	22	2100	all
"	329	"	24	2100	360-340
"	331	"	26	0000	all
"	332	"	27	0600	320-290
"	333	"	28	0000	150-64
"	334	"	29	0600	270-220
"	"	"	"	1800	75-66
"	337	December	2	1800	220-200, 130-120
"	339	"	4	1200	all
"	341	"	6	1500	535-520

Station No.	Julian day	Date (1972)		Launch time (GMT)	Height (mb)
		QUESTIONABLE HEIGHT VALUES			
3	291	October	17	1200	all
"	318	November	13	1200	60 m higher at 500
"	320	"	15	0000	500 mb 67 m difference
4	283	October	9	1800	500
"	284	"	10	0600	280-225
5	281	"	7	2100	all
6	317	November	12	0000	500
"	"	"	"	1200	500
"	329	"	24	1200	500

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